

INITIAL	DATE
CW	5-22-91
RWB	5/22/91
LC	5/22/91
JB	5/22/91

cc:

BA/EN
WR MT
Mail Stop 60190

MAY 23 1991

Memorandum

To: ARD, Refuges and Wildlife (60130)
Attention: Barney Schranck

From: Regional Engineer, Region 6

Subject: 1990-1991 Annual Water Use Report/Management Plan

The subject report for Medicine Lake National Wildlife Refuge has been reviewed and approved.

Regarding the discussion on page 19 of proposed management for Medicine Lake: the spillway elevation of Dam #4 is actually 1935.86, but the management elevation has been lowered to 1935.77 to offset the higher storage elevation of Sayer Bay. Therefore, in years of high runoff, the gates must be opened before water begins spilling, in order to keep lake levels from exceeding the 1935.77 level.

It is a good idea to install float gages in the lakes so that we can better manage and document our water use. Please provide us with a draft application once spring development is completed (blank form attached). Does the estimated maximum diversion (page 13) include seasonal use (evaporation)? The long range plan is a good idea. We suggest using the format developed in North and South Dakota (Sand Lake, Arrowwood, Upper Souris) to document ties to Refuge objectives and authorities. The Water Resources Division would be willing to participate, but expects that the process will take longer than a year. We may also want to discuss the plan in the meeting with the State and other users.

Please extend our thanks to Refuge personnel for the submission of this report. We appreciate the effort that went into its preparation. Also, the manager is to be commended for his efforts to protect the Refuge's water rights.

/s/ A. E. BEVILACQUA

bcc: EN rf
Circ rf
EN:LCoe:lc:4-18-91
Revised:EN:CWilliss:WTR:RGreen:lc:5/20/91
WTR (60189)

UNITED STATES GOVERNMENT

MEMORANDUM

WATRPLAN.MEM

DATE: January 23, 1991
TO: Associate Manager, Zone I, Refuges & Wildlife, Region 6
FROM: Refuge Manager, Medicine Lake National Wildlife Refuge
SUBJECT: 1990/91 Water Use Report/Management Plan

Attached is our 1990 Water Use Report and our recommended 1991 Water Management Plan. These reports are in response to the FY 91 Regional resource planning directives.

There is one section of the Annual Water Management Plan which should receive immediate attention. On pages 21 and 22, Enforcement of Refuge Water Rights is discussed. I am making some recommendations there that may require extra work and close coordination with the Region 6 Water Rights office. When the Water Rights office has reviewed my recommendations, I will be interested in discussing with you and them the best way we should proceed.

We have been hoping for a very snowy winter so that some of the recommended actions would be made moot by a big spring run-off. However, the snow accumulation so far is not very encouraging.

Jim McCallum



JAN 25 1991

ANNUAL WATER MANAGEMENT

REPORT and PLAN

1990 WATER USE REPORT

RECOMMENDED 1991 WATER MANAGEMENT PLAN

MEDICINE LAKE NATIONAL WILDLIFE REFUGE

MEDICINE LAKE, MONTANA

UNITED STATES DEPARTMENT OF INTERIOR

FISH AND WILDLIFE SERVICE

REGION 6

Submitted: James E Mc Collum Date: 1/23/91
Refuge Manager

Reviewed: Samuel W. Schenck Date: 1/29/91
Associate Manager, Zone I

Reviewed: _____ Date: _____

Reviewed: _____ Date: _____

I. 1990 WATER USE REPORT

A. General

The 1980s Northern Great Plains drought continued into the 1990s in northeastern Montana. Total precipitation at the official National Weather Service station at Medicine Lake refuge was only 8.16 inches compared to the 51 year (1939-1989) average of 13.48 inches. Average temperatures were generally a few degrees above normal each month. January was the exception with an average of 24.3 degrees, 17.3 degrees above the normal of 7.

Total water diversion in 1990 was 3,464.4 acre feet. That amount was negligible in comparison to the amount needed to meet refuge plans and objectives. In 1989 a below normal spring run-off still recharged several refuge lakes sufficiently to reach management levels. This year, there was either very minimal or no flow to recharge them. The result was that refuge lakes started the year in fair or poor shape and declined in condition throughout the year.

Except for Big Muddy Creek, stream flow into the refuge was essentially non-existent this year. With minimal snow fall during the winter in the watershed, there was only a minor flow from spring snowmelt. Largest flows occurred during the summer when a few locally heavy thunderstorms sent two or three small surges down the Muddy Creek channel.

On January 1, 1990, the refuge water deficit was 37,842 acre feet. By year's end the deficit had increase to 46,259 acre feet. Table I-1 indicates the early 1990 deficit by lake with comparison to other recent years. Table I-2 compares 1990 water deficits with stream flow, diversions, and releases.

B. Water Rights

A detailed discussion of water rights filings was included in the 1989 Water Use Report. That report should be consulted for a summary of refuge water rights claims and applications.

No action has been taken by the Montana Water Court on any of the applications the Servicesubmitted for Medicine Lake Refuge in the 1982 refiling process. Based on progress the Water Court is making in settling claims in other basins, it is likely to be several years before the Big Muddy Creek watershed is adjudicated.

Use of water from Big Muddy Creek by up-stream farm irrigators consumed a substantial percentage of the stream flow in April and May. Refuge staff documented irrigation of several hundred acres by water users holding permits or rights junior to the refuge water right. Contact was made with the Region 6 Water Rights Office

Table I-1

COMPARISON OF WATER DEFICITS IN ACRE FEET BY LAKE
ON JANUARY 1

LAKE NAME	LAKE CAPACITY IN ACRE FEET #	LAKE DEFICIT IN ACRE FEET				
		1990	1989	1988	1987	1986
MEDICINE	88,290	21,744	24,185	(@)	(@)	17,797
HOMESTEAD	8,216	7,509	7,509	5,602	3,70	6,938
12	2,500*	1,580	1,580	(@)		2,396
KATY'S	1,850*	1,850	1,850			1,170
11	497*	438	438			497
10	1,150*	968	904			319
DEEP	450*	277	376			378
SAYER	787	500	711			425
GAFFNEY	4,694	2,599	2,851			3,222
LONG	377*	377	377			215
TOTALS		37,842	40,781	(@)	(@)	33,357

at management elevations

* amounts are estimates based on surface acres & approx avg. depth.

@ deficits not available for these years

Table I-2.

SUMMARY OF WATER DEFICITS, DIVERSIONS & RELEASES
IN ACRE FEET

YEAR	WATER DEFICIT JANUARY 1	WATER DIVERTED	WATER RELEASED	WATER DEFICIT DECEMBER 31
1990	37,842	3,464.4	0	46,259
1989	40,781	22,719.5	2,745	37,842
1988	*	122.0	1,000	40,781
1987	*	9,316.0	7,123	*

*information not available

and the Montana Water Resources Office in Glasgow, MT. We learned there was nothing the Water Resources office would or could do to enforce the refuge priority. Their recommendation was that the Service negotiate with each individual irrigator to defer to the senior Service water right. By the time all this had occurred, stream flow had declined to the point where it was not worth pursuing the matter further this year. The recommended 1991 Water Management Plan which accompanies this report makes several recommendations on this topic for 1991 which will require close coordination and action from the refuge staff and several divisions of the Regional Office.

C. Actual Use

1. Type of Use

a. Stream Flow and Diversions

Indian Service Dam at the Homestead Unit remained closed all year. Diversion Dam Number 1 was closed from January to November. On November 25 the screw gates were opened to permit water to flow down the main channel of Big Muddy Creek to the Homestead unit. Total stream diversions in 1990 amounted to 3,464.4 acre feet. Table I-3 displays this information.

Table I-3.

1990 WATER DIVERSIONS BY STREAM AND LOCATION OF USE

SOURCE	ACRE FEET DIVERTED	LAKE WHERE USED	PERIOD OF DIVERSION
BIG MUDDY CRK	3,440.0 (1)	MEDICINE	MAR - SEP
BIG MUDDY CRK	[1,200.0*](3)	HOMESTEAD	MAR - JUN
COTTONWOOD CRK	0 (2)	11, 10, SAYER, GAFFNEY	N/A
SAND CREEK	0 (2)	10, SAYER, GAFFNEY	N/A
LOST CREEK	0 (3)	HOMESTEAD	N/A
SHEEP CREEK	0 (3)	HOMESTEAD	N/A
LAKE CREEK	24.4 (2)	12	MAY
TOTAL	3,464.4		

(1) measured by U.S. Geological Survey, Ft. Peck MT.

(2) measured by refuge staff at stream gages.

(3) diversion estimated by refuge staff.

* water transferred from Medicine Lake, not included in totals.

b. Discharges

No water was discharged from Homestead Lake in 1990. From March 20 to April 13, about 1,200 acre feet were discharge from Medicine Lake to Homestead Lake via Lake Creek and Big Muddy Creek. These discharges were held up at Indian Service Dam on Big Muddy Creek for diversion into the Homestead Unit.

2. Wells

There were six water wells in use on the refuge in 1990. Table I-4 indicates estimated water use from those wells.

Table I-4.

GROUND WATER USE FROM REFUGE WELLS IN 1990

WELL NAME	LOCATION	PURPOSE	PERIOD OF USE	AMOUNT *
HEADQTRS # 2	Sec 33 T32N R56E	HOUSEHOLD & OFFICE USE	JAN - DEC	2.3 AF
HEADQTRS # 1	Sec 33 T32N R56E	YARD IRRIGATION	APR - NOV	4.0 AF
OIL WELL # 1-13 ...	Sec 13, T32N R57E	INDUSTRIAL	JAN - DEC	0.7 AF
OIL WELL # 1-14 ...	Sec 14, T32N R57E	INDUSTRIAL	JAN - DEC	0.7 AF
SANDHILLS # 1	Sec 17 T31N R57E	LIVESTOCK	MAY - SEP	0.3 AF
SANDHILLS # 3	Sec 20 T31N R57E	LIVESTOCK	MAY - SEP	0.4 AF
TOTAL				8.4 AF

* estimated acre feet used

D. Maintenance, Rehabilitation and Construction

Ducks Unlimited began a construction project at Homestead Lake in October, 1989. Work included dikes to separate Knudsen Bay from the northern portion of Homestead Lake and a new steel sheet piling stoplog water control structure to control discharges from Knudsen Bay. The project continued into 1990 and was completed in February. These structures provide improved water management capability for the entire lake and should facilitate control of avian botulism outbreaks in the future.

Taking advantage of very low lake levels in October, the refuge crew installed eight inch vertical plastic pipes on the shore-lines of Homestead, Gaffney and Long Lakes for future use as gages when lake levels fall below water control structure gages. A one inch plastic pipe provides connection between the lake and the gage pipe. When completed in 1991, a float, pointer, and staff gage will provide a direct reading of lake levels whenever the lake is high enough to supply water to the apparatus.

In November, some preliminary spring development work was done in a habitat management unit on the southeast side of Medicine Lake. This work will be continued in 1991. If the spring is successfully developed, application will be made to the Montana Water Office for a permit to use the water for wildlife and livestock purposes.

E. Impoundment Data

As soon as ice breaks up on refuge lakes each spring, water level gages are read and recorded. Gages are then checked at least weekly during spring run-off. After water levels stabilize, gages are checked monthly until lakes freeze up again in late fall.

Following is discussion of management for each of the ten refuge lakes and tables showing water levels throughout the season.

1. Medicine Lake

Diversions into Medicine Lake from Muddy Creek continued through the winter with small amounts of water (0.5 to 2 CFS) flowing under the ice on the creek. By March 31, ice on the creek had broken up and water was moving freely. With no spring flood conditions, all stream flow remained in the creek channel this year. Water measurements at the Dam # 2 weir are a very accurate representation of actual stream flow. The creek continued to run through the spring and summer. Peak flows occurred April 5 with 86 CFS, July 3 with 105 CFS and August 23 with 102 CFS. Flow declined to less than 0.5 CFS by late September. On September 27, the diversion weir was closed for the remainder of the year.

Snow cover on Medicine Lake was minimal throughout the winter. As a result, oxygen levels remained high. In contrast to the major fish-kill that occurred in 1989, extremely few winter killed fish were found when ice-out occurred on April 6.

On October 2, gates at Dam #4 were opened to flush accumulated silt from the approach channel and replace the staff gage on the water control structure. When the pool of water accumulated on the up-stream side of the WCS drained thru the structure, we found that the water levels on the lake were too low to permit any further discharge of water from the lake.

Table I-5.

MEDICINE LAKE GAGE READINGS
and
WATER DEFICITS IN 1990

Medicine Lake Management Level is 1935.77 feet MSL Lake Capacity is Estimated at 88,290 Acre Feet			
MONTH	LAKE SURFACE ELEVATION	DIFFERENCE FROM MGMT LEVEL	WATER DEFICIT IN ACRE FEET
January.....	1933.02	-2.75	21,744
February.....	1933.08	-2.69	
March.....	1933.08	-2.69	
April.....	1933.10	-2.67	
May.....	1932.94	-2.83	
June.....	1932.52	-3.25	
July.....	1932.38	-3.39	
August.....	1931.78	-3.99	
September....	1931.48	-4.29	
October.....	1931.36	-4.41	
November.....	1931.24	-4.53	
December.....	1931.26	-4.51	28,200

2. Lake 12

Inflow from Lake Creek was practically non-existent this year. The creek was dry when stream gages were activated in April. Starting in May, springs up stream from the refuge provided enough water to make a showing on the gage. Total stream flow was measured at 24.4 acre feet.

The lake started off very low, quickly fell below gaging level, and declined throughout the year. By freeze-up the remaining water consisted of several scattered shallow pools separated by wide mud flats. There was no discharge from the lake downstream to Lake 11 or to Katy's Lake.

Elevation not on Permits.

*Current elevation of 1935.26
new mgmt level 1935.77*

*Storage in Med. Lake will change
from 30,492 AF to 29,636 AF
(856 AF)*

Table I-6.

LAKE 12 GAGE READINGS
and
WATER DEFICITS IN 1990

Lake 12 Management Level is 1948.52 feet MSL Lake capacity is estimated at 2,500 Acre Feet			
MONTH	LAKE SURFACE ELEVATION	DIFFERENCE FROM MGMT LEVEL	WATER DEFICIT IN ACRE FEET
January.....	1944.12	-4.40	1,580**
February.....	1944.12	-4.40	
March.....	1944.14	-4.38	
April.....	1944.10	-4.42	
May.....	1944.06	-4.46	
June.....	1943.62	-4.90	
July.....	*		2,250**
August.....	*		
September....	*		
October.....	*		
November.....	*		
December.....	1042.14 #	-6.38	

* Water below gage

** Estimated water deficit

Elevation checked with surveying instruments

3. Katy's Lake

There were no diversions and no runoff from surrounding uplands to Katy's Lake in 1990. Water levels in the lake remained below the gage throughout the year. There was sufficient water to maintain about 100 yards of very shallow open water around the island (Shawver Island) built by Ducks Unlimited in 1986. The water deficiency for the unit remained at about 1,850 acre feet throughout the year.

4. Lake 11

The year began with Lake 11 practically dry. There were no flows from Cottonwood Creek into the lake this year. This resulted in the lake remaining mostly dry the entire year. A heavy rain storm in early September added a minor amount of water to the unit. This was quickly absorbed by the dry soil in the lake bottom. At year's end the water deficit was 497 acre feet.

5. Lake 10

Lake 10 received no stream flow. Water levels in Lake 10 are normally well supported by the water table and such was the case this year with water levels rising 1.4 feet from January to mid-May. However, lack of stream flow or significant precipitation began to take its toll by mid-summer. Water levels fell below the gage in August. By the end of September, pools that normally support large numbers of canvasbacks, tundra swans and other waterfowl were only a few inches deep and had very little bird use. By freeze-up most of the unit was devoid of water except in old stream channels.

Table I-7.

LAKE 10 GAGE READINGS IN 1990

Lake 10 Management Level is 1938.66 feet MSL			
MONTH	LAKE SURFACE ELEVATION	DIFFERENCE FROM MGMT LEVEL	WATER DEFICIT IN ACRE FEET
January.....	1935.66	-3.00	968**
February.....	1936.08	-2.58	
March.....	1936.60	-2.06	
April.....	1936.84	-2.82	
May.....	1937.06	-1.60	
June.....	1936.92	-1.74	
July.....	1936.34	-2.32	
August.....	*		1,050**
September....	*		
October.....	*		
November.....	*		
December.....	1934.80 #	-3.86	

* Water level below gage

** Estimate

Elevation checked with surveying instruments

7. Gaffney Lake

Gaffney Lake received no inflow in 1990 except from natural springs. The lake remained below the Tax Bay discharge gate all year. By mid-summer declining water levels exposed sand bars which divided the lake into five pools. Waterfowl use in the fall was substantial in comparison to other small lakes but still below what is normally expected. The low lake level exposed springs along the northeast shore. For a few days after freeze-up several other underwater springs in the same area were indicated by small open holes in the ice. The information in the table below is based on estimates except for the December reading which was obtained by using a surveyor's level.

Table I-8.

GAFFNEY LAKE LEVELS IN 1990

Gaffney Lake Management Level is 1937.00 feet MSL			
MONTH	LAKE SURFACE ELEVATION	DIFFERENCE FROM MGMT LEVEL	WATER DEFICIT IN ACRE FEET
January.....	1932.98 *	-5.68	2,628**
February.....			
March.....			
April.....			
May.....			
June.....			
July.....			
August.....			
September....			
October.....			
November.....			
December.....	1932.36 #	-6.30	2,962**

* Estimated elevation

** estimated deficit

Elevation checked with surveying instruments

8. Sayer Bay

The story for Sayer Bay in 1990 is the same as for other water units -- no inflow and generally declining water levels all year. The slight increase of 0.14 foot from January to April likely resulted from ground water recharge and precipitation during this period of minimal evaporation. By year's end the only water in the unit was found in the old creek channel. No avian botulism outbreak occurred in the unit this year.

Table I-9.

SAYER BAY GAGE READINGS IN 1990

Sayer Bay Management Level is 1938.66 feet MSL			
MONTH	LAKE SURFACE ELEVATION	DIFFERENCE FROM MGMT LEVEL	WATER DEFICIT IN ACRE FEET
January.....	1935.76	-2.90	500**
February.....	1935.78	-2.88	
March.....	1935.80	-2.86	
April.....	1935.90	-2.76	
May.....	1935.54	-3.12	
June.....	1935.12	-3.54	
July.....	*		686**
August.....	*		
September....	*		
October.....	*		
November.....	*		
December.....	1933.45 #	-5.21	

* Water level below gage	** Estimate
# Elevation checked with surveying instruments	

9. Long Lake

Long Lake was almost dry at the start of the year, received no inflow, and dried up completely by mid-June. At both the beginning and the end of the year the water deficit in the lake was estimated at 377 acre feet.

10. Deep Lake

Deep Lake received no run-off this year. Even though water levels declined through the summer, because of its depth, it retained a good supply of water throughout the year. Submergent vegetation growth appeared to be good. The lake received good use by diving ducks during the late summer and fall.

The new float gage installed on the north shore of the lake late in 1989 was not effective in providing water level this year. The water level fell below the bottom of the gage early in the year.

Table I-10.

DEEP LAKE GAGE READINGS IN 1990

Deep Lake Management Level is 1938.66 feet MSL			
MONTH	LAKE SURFACE ELEVATION	DIFFERENCE FROM MGMT LEVEL	WATER DEFICIT IN ACRE FEET
January.....	1935.86**	-2.80	277**
February.....	*		
March.....	*		
April.....	*		
May.....	*		
June.....	*		
July.....	*		
August.....	*		
September....	*		
October.....	*		
November.....	*		
December.....	1933.95 #	-4.51	337**

* Water below gage level

** Estimated

Elevation checked with surveying instruments

** No readings taken; water below gage level

11. Homestead Lake

The year began with Homestead Lake mostly dry. No water was added to the unit in the fall of 1989 because of the planned Ducks Unlimited work there. There were no inflows from Sheep Creek and Lost Creek this year. Both the Sheep Creek and Breeser subunits, which depend upon Sheep Creek were dry throughout the year.

Diversions of water from Muddy Creek to Homestead Lake began March 30 using water being discharged from Medicine Lake. It quickly became apparent that there would be insufficient water available to fill the entire lake. The WCS in the new Knudsen Bay dike was then closed to retain all diverted water in the north portion of the lake. As a result Knudsen Bay remain dry through the year. Total transfer of water from Medicine Lake to Homestead was estimated at 1,200 acre feet. There was no fall diversion into Homestead Lake from Muddy Creek.

Although management level was not reached, water levels in north Homestead Lake held up fairly well after diversions ended in late April. By mid-summer it appeared that the avian botulism would not be a serious problem and no water was discharged from the unit.

Table I-11.

HOMESTEAD LAKE GAGE READINGS IN 1990

Homestead Lake Management Level is 1930.40 feet MSL			
MONTH	LAKE SURFACE ELEVATION	DIFFERENCE FROM MGMT LEVEL	WATER DEFICIT IN ACRE FEET
January.....	1925.76*	-4.66	7,509*
February.....	1925.76*	-4.64	
March.....	1925.76*	-4.64	
April.....	1928.10	-2.30	
May.....	1927.80	-2.60	
June.....	1927.28	-3.12	
July.....	1926.90	-3.50	
August.....	**		8,050*
September....	**		
October.....	**		
November.....	**		
December.....	1924.50*	-5.90	

* Estimates

** Lake levels below gage

F. Water Quality Monitoring

No water quality readings were taken on any refuge lakes in 1990.

II. RECOMMENDATIONS AND OBJECTIVES FOR WATER MANAGEMENT IN 1990

A. General Recommendations for Refuge Impoundments and Water Management

As 1991 begins, all refuge impoundments are seriously short of water. Prospects for a good flow of spring run-off are problematic because of very low top soil moisture and low water levels in retention dams throughout the watershed. The following recommendations are made with the aim of achieving maximum refuge benefit from water which is available for diversion to refuge lakes.

1. Use all stream flow available at refuge diversion points to fill refuge impoundments according to the priorities shown in Table II-1 as early as possible to ensure retaining appropriated flow from spring run-off and to achieve wildlife management objectives.

2. Fill eastern impoundments with flows from Lake Creek, Sand Creek and Cottonwood Creek before allowing these waters to enter Medicine Lake. Water should not be discharged from Sayer Bay until after Gaffney Lake and Long Lake have reached 1991 management levels. Take all necessary actions to prevent upstream migration of carp from Medicine Lake to Sayer Bay, Gaffney Lake, or Long Lake during any manageable overflow situation.

3. Provide for as much flushing action as possible from all lakes with available spring and summer run-off. This will improve water qualities by reducing salinity.

4. Continue to collect water quality information by taking salinity and conductivity readings for all major water flows entering or being discharged from the refuge. Spring and late fall readings should be collected, as in the past, for all major impoundments. The collection of these data will document any changes in water quality occurring over the years.

5. Monitor all stream and lake gages at least weekly during spring runoff and monthly thereafter to insure accurate measurement of water conditions and use.

B. Water Use Priorities and Planned Diversions

Table II-1 shows the priority of water use on the refuge. Priority 1 impoundments should be filled and maintained before priority 2 impoundments. Priority 3 lakes should be filled last.

Table II-2 indicates the amounts of water which will potentially be diverted at each major point of diversion and where that water will be used. The maximum planned diversion for 1991 is 46,259 acre feet. That is the estimated water deficit on January 1, 1991.

TABLE II-1.

PROPOSED 1991 WATER USE PRIORITY

UNIT	MANAGEMENT PURPOSE	PRIORITY	ACRE FEET NEEDED
Lake 12	1. Waterfowl nesting, brooding, 2. Water storage	1	2,250
Katy's Lake	1. Waterfowl nesting 2. Water storage	1	1,850
Lake 11	1. Waterfowl nesting, brooding, 2. Water storage	1	497
Lake 10	1. Waterfowl nesting, brooding 2. Water storage	1	1,050
Gaffney Lake	1. Waterfowl nesting, brooding 2. Waterfowl migration staging 3. Water storage 4. Fishery	2	2,962
Deep Lake	1. Waterfowl nesting, brooding 2. Water storage	1	337
Long Lake	1. Waterfowl nesting, brooding 2. Piping plover nesting 3. Water storage	3	377
Sayer Bay	1. Waterfowl nesting, brooding 2. Water storage	1	686
Medicine Lake	1. Waterfowl nesting, brooding 2. Waterfowl migration staging 3. Water storage 4. Fishery	3	28,200
Homestead Lake	1. Waterfowl nesting, brooding 2. Water storage 3. Waterfowl migration staging	1	8,050
Sheep Crk Unit	1. Waterfowl nesting, brooding	1	(500)*
Breaser Unit	1. Waterfowl nesting, brooding	1	(500)*
Knudsen Bay	1. Waterfowl nesting, brooding 2. Waterfowl migration staging	2	(2,600)*
TOTAL			46,259

* included in Homestead Lake total

Table II-2

Planned Diversions by Point of Diversion in 1991

Point of Diversion	Contributing Stream & Claim Number	Maximum Diversion Rate	Places of Use	Planned Diversion for 1991
NWSE Sec 22 32N 55E	Big Muddy Cr #233169	1200 CFS	Medicine L.	28,200
NESE Sec 28 31N 55E	Big Muddy Cr #233168	50 CFS	Homestead L	8,050
SESW Sec 13 32N 57E	Lake Creek #233167	100 CFS	Lake 12 Katy's Lake Lake 11 Lake 10 Deep Lake Gaffney L Long Lake Sayer Bay Medicine L.	Entire flow up to 10,009 A.F.
NWSE Sec 23 32N 57E	Cottonwood Cr #233163	100 CFS	Lake 11 Lake 10 Deep Lake Gaffney L Long Lake Sayer Bay Medicine L	Entire flow up to 5,909 A.F.
SE Sec 22 32N 57E	Sand Creek #233164	75 CFS	Lake 10 Deep Lake Gaffney L Long Lake Sayer Bay Medicine L	Entire flow up to 5,412 A.F.
SESW Sec 33 T31N R55E	Sheep Creek #233166 #242886	320 CFS	Homestead L	All up to 8,050 AF total
SESW Sec 33 T31N R55E	Lost Creek #233165	25 CFS	Homestead L	All up to 8,050 AF total
TOTAL PLANNED DIVERSION *				46,259 AF

* The total acre feet indicated is less than the sum of the column. The total shown is the total water deficit as of January 1, 1991. Amounts indicated for each diversion is the total acre feet needed for the listed water units if no water was available from other sources.

C. Specific Recommendations and Objectives for Individual Impoundments for 1991

1. Homestead Lake and Subunits

This 2,170 acre impoundment is very low and will require approximately 8,050 acre feet of water to meet management objectives. All flows from Sheep Creek, Lost Creek and Big Muddy Creek will be retained in this impoundment until it is filled. If spring water flows appear to be below normal again, all available water flows from the Big Muddy will be allowed to bypass the Diversion Dam # 1 structure and continue down Big Muddy Creek. It will then be diverted into Homestead Lake at dam #6 inlet structure until the lake is brought up to the full operational elevation of 1930.40. With completion of the cross dike dividing Knudsen Bay from the remainder of the lake, water management will change from the past. If water supplies are short, the north part of the lake will have priority for filling.

To the maximum extent possible, the Homestead water units will be filled with flows from Sheep Creek and Lost Creek. This will preserve Muddy Creek flows for diversion to Medicine Lake. If adequate flows appear to be available to fill all Homestead units as well as Medicine Lake, flushing of Homestead will be accomplished by diverting water into the lake and then releasing water through dam #6 discharge structure back into the Big Muddy Creek channel.

Construction funds have been applied for to rehabilitate the #6 inlet structure and the #6 outlet structure. The availability of funds and timing of the contract may have an effect on water management activities at the unit.

Specific Objectives for Homestead Lake in 1991

- a. Bring the lake up to management level as quickly as possible in the spring to provide optimum waterfowl breeding pair habitat.
- b. Maintain water levels at management elevations thru June 1 to provide optimum over-water nesting sites in emergent vegetation for waterfowl, grebes, and black-crowned night herons.
- c. Maintain water around the constructed nesting islands to provide secure nesting sites for geese and other waterfowl through July 1.
- d. Aquatic vegetation should flourish in this relatively shallow impoundment.
- e. To reduce the hazard and severity of avian botulism, Knudsen Bay will be drawn down beginning in late June. The volume of water released must be controlled to prevent flooding the access crossing to hay fields downstream. Water will be retained in the North Bay. If botulism occurs there,

sufficient water will be discharged to expose the stands of emergent shoreline vegetation which seem to be associated with some botulism outbreaks.

f. If funding becomes available and contracts are issued, be prepared to release water from the #6 discharge structure and from Indian Service Dam to permit construction activity to begin without delay.

f. If water levels and construction status permits, water will be released from Medicine Lake in mid-September and will be diverted into Homestead Lake. Bring levels up to a minimum elevation of 1926.76 MSL to provide adequate fall migration habitat for waterfowl. Up to 2,000 acre feet of water from Medicine Lake will be required to accomplish this objective.

2. Lakes 10, 11, 12, Deep Lake & Gaffney Lake

Water levels for this series of water units are all dependent on spring run-off from Cottonwood, Sand and Lake Creeks. The present water level of these units range from 4 to 5 feet below management levels. Upstream impoundments will be filled first, then each impoundment below. If flows are adequate, water control structures will be opened rather than relying on spillways. This provides the best flushing action, and allows for the reduction of accumulated salinity in these units.

Specific Objectives To Be Met In 1991

a. Fill all impoundments to operational levels as early as possible to provide breeding pair habitat and secure island nesting sites for canada geese.

b. If water reaches operational levels, breeding pair habitat for waterfowl will be maximized.

c. Do not exceed operational levels to minimize loss of goose nesting sites and to reduce erosion by wave action on constructed and natural nesting islands.

d. After spring runoff, no water releases or drawdowns will be accomplished unless demanded by outbreaks of botulism. By maintaining water levels as close to operational level as possible, brood habitat will be optimized. After losses to evaporation and underflow, levels will remain adequate for fall migration.

e. Lakes 10 and Gaffney have been historic sites for avian botulism. Rapid flooding of shallow areas following heavy summer rain storms seems to trigger outbreaks in these impoundments. These outbreaks can be minimized or the severity reduced by maintaining constant water levels. If a serious outbreak of botulism occurs in these units, consideration will be given to drawing the units down to levels sufficient to dry out the botulism hot spots.

f. When Lake 10 reaches management level, water will be passed first to Sayer Bay and Deep Lake then to Gaffney Lake after Sayer Bay and Deep lake are filled.

g. When Lake 12 reaches management level, water will be diverted equally to Katy's Lake and released to Lake 11. If Lake 11 has already reached management level or appears likely to, all water surplus from Lake 12 will be diverted to Katy's Lake before being released downstream.

3. Katy's Lake

Katy's Lake is a natural sump and has no outlet to provide the option of flushing. It is also the most saline lake on the refuge. Limited surface drainage and diversion of water from Lake 12 are the only sources of fresh water for this marsh units.

Specific Objectives for Katy's Lake In 1991

a. If water is available, Katy's lake should be filled to maximum operational levels before any discharges are made from Lake 12 to Lake 11.

b. Katy's Lake has a history of botulism. Rapid rises in mid-summer water levels must be prevented to alleviate losses.

4. Sayer Bay

This is an excellent waterfowl production unit and provides excellent migrational habitat as well. Severe avian botulism outbreaks have occurred in this area, however, and disease is a yearly concern on this unit.

Specific Objectives for Sayer Bay in 1991

a. To maximize breeding pair and brood habitat, the unit will be filled to management level of 1938.66 if water is available. No water will be discharged from Sayer until Gaffney and Long Lakes have reached their management levels.

b. This impoundment will be closely monitored for avian botulism. With the large number of waterfowl and broods utilizing the area, the potential for significant botulism losses is high. If a major outbreak occurs, it is recommended to pull stop logs, and quickly draw the water level down to about the 1935.0 elevation. At this elevation the shallow water along the edge is eliminated. This method was used effectively to reduce losses in 1984. Prevention of rapid increases in water levels, following heavy mid-summer thunderstorms, is desirable. Reflooding of shallow vegetated mud flats can trigger an avian botulism outbreak.

5. Long Lake

Management level for Long Lake in 1991 will be 1937.16. This is 1.5 feet below the traditional management elevation. This change is being made to provide shoreline nesting habitat for nesting piping plovers which have nested or attempted to nest there for the last several years.

Specific Objectives for Long Lake in 1991

- a. Filling of Long Lake should begin as soon as water can be discharged from Gaffney.
- b. Water levels should be staged up to elevation 1937.16 which should be sufficient to leave some exposed beach for piping plover use around the south shore line.
- c. Inflow from Gaffney Lake should be terminated upon reaching Long Lake management level. If sufficient water is available to fill Gaffney Lake to its management level, then additional water should be passed through Long Lake and discharged to Medicine Lake. This will assist in flushing some of the high salt concentrations present in the unit.

6. Medicine Lake

The January 1, 1991 elevation of the lake was 1931.26, 4.51 feet below the operational level of 1935.77. To fill the lake to management level will require about 28,200 acre feet of water. Since Medicine Lake is a priority 3 impoundment, it will receive run-off from tributaries only after other impoundments are filled. Once Homestead Lake reaches operational level in the spring, all available waters from the Big Muddy Creek will be diverted into Medicine Lake.

Some of the early flow into Medicine Lake should be immediately discharged to flush accumulated silt from the discharge channel east of Dam #4. If run-off exceeds 28,200 acre feet and the lake reaches management level, overflow at the Dam 4 spillway will begin at lake elevation 1935.77. Once the lake reaches management level, the weirs at the Diversion Dam # 2 on Big Muddy creek will remain open, but, excess waters will be simultaneously discharged from the lake. If the lake elevation rises above management level by more than 0.5 foot the gates in Dam #4 must be opened to discharge excess water and bring the lake back to management level.

If heavy summer thunderstorms produce heavy silt laden waters in Big Muddy Creek, these waters may be prevented from entering Medicine Lake by opening the Dam #1 gates on Big Muddy Creek and closing the diversion canal. This will reduce sediment deposits on the west end of Medicine Lake.

Specific Objectives for Medicine Lake in 1991

By filling Medicine Lake to an elevation of 1935.77 feet in the early spring, the following objectives will be met.

a. Waterfowl breeding pair habitat will be adequate. Water levels in emergent vegetation will provide nesting locations for over-water nesters including diving ducks, grebes, and black-crowned night herons.

b. Natural islands will be secure and provide nesting sites for geese, pelicans, cormorants, and great blue herons.

c. After normal evaporative loss during the summer, early fall water levels will still be adequate to allow water to be released to Homestead Lake. This will provide desirable migrational waterfowl habitat on both Homestead and Medicine Lake. This slightly reduced water level at Medicine Lake will still provide adequate water depth to protect the overwintering fish population.

d. This elevation will provide excellent early spring northern pike spawning habitat in the emergent vegetation stands west of Highway #16.

e. Erosion of islands and shorelines by wave action will not be excessive. This level has been commonly reached in past years without causing excessive erosion.

C. Construction, Repair, Maintenance and Rehabilitation

A number of projects are planned for 1991 on water management facilities. Following is a list and brief description of each proposed project.

Homestead Lake: Repair spalled and eroded concrete on the Dam #6 discharge structure. Rehabilitate the Dam #6 inlet structure by installing a concrete stop log WCS. Clear dead trees along the main dike.

Sheep Creek Bay: Install a concrete slab on the spillway road crossing.

Medicine Lake: Relocate the lake float gage if it is found to be influenced by headquarters well #2.

Gaffney Lake: Install stainless steel stoplog slots in the main discharge water control structure. Modify the discharge WCS to permit widening the county road that crosses the structure. Install a new lake gage at the resurveyed elevation.

Deep Lake: If the lake level falls further from the 1990 level, reinstall the float gage at a new and deeper level. Dismantle and remove the remains of the old WCS on the channel southeast of the lake.

Katy's Lake: Adjust the lake gage to the 1988 resurveyed management elevation.

Lake Creek Gage: Place rip-rap rock around the base of the gage support pipe. Explore with the landowner of the site (John Crohn) about improvements on the concrete flume located in the creek channel to improve water flow measurement capabilities.

Springs and Wells: (1) Complete the spring development in management unit G-9 to provide water for better livestock management in the area southeast of Medicine Lake. (2) Explore the possibility of drilling a water well near the northeast corner of the Sandhills management unit to replace the windmill destroyed by a windstorm in 1990. The well would be drilled outside the boundary of the wilderness unit. If a new well is successfully developed, the damaged windmill in the wilderness unit would be dismantled and removed.

D. Other Planned or Needed Actions

1. Long Range Water Management Plan

✓ A comprehensive long range water management and monitoring plan will be prepared this year. Although a lot of notes, reports, memos and other documents have been written over the years, a good reference and guiding plan is not now available. Such a plan, properly prepared, will greatly simplify preparation of the Annual Report/Plan.

2. Lake Capacity Tables

In 1989 the Region 6 Water Resources office prepared surface area and capacity tables for Medicine Lake and Sayer Bay. These are excellent references for determining amounts of water stored and water deficits. Storage and water deficits for the other refuge lakes are estimated. It would be of great benefit to the refuge water management program if area and capacity tables could be developed for all the refuge lakes.

3. Enforcement of Refuge Water Rights

Probably the most important recommended action is reserved for last. It relates to Service actions to insure the Refuge receives the water it is entitled to from area streams during years of short flows. Since Big Muddy Creek is the primary source of water for Medicine Lake and Homestead Lake, upstream diversions of water from the creek can have a major impact on accomplishment of refuge objectives in years of low spring run-off.

The Service has on file with the Montana Water Resources Office, two claims on Big Muddy Creek with priority dates of August 19, 1935, for fish and wildlife management purposes. The claim for Homestead Lake is for 50 cubic feet per second and the claim for Medicine Lake is for 1,200 cubic feet per second.

For many years farm land irrigation has been conducted each spring in the Big Muddy Creek flood plain upstream from the refuge. During the high spring flow, usually in late March or April, irrigators use either diversion dams or large pumps to divert water from the creek channel to flood nearby crop or hay fields. During years of significant winter snows, the spring run-off is sufficient to provide water for both irrigation and refuge needs. After dry winters, as has been the case most years in the past decade, irrigators short-stop a substantial percentage of the water before it gets to the refuge. Many of the irrigation activities are based on claims or permits that are junior to the refuge water right.

To insure that the refuge gets its rightful share of water in 1991, the following steps are recommended:

a. Upon approval of this plan, the refuge should make a "call for water" in the form of a letter sent to the Montana Department of Water Resources and to all known irrigators in the Big Muddy Creek watershed. The letter should detail the refuge requirements for water, both in volume and period of diversion for 1991. This information is listed in Table II-2 of this report. The refuge should work closely with the Montana Water Resources Office and the Region 6 Water Rights Office prior to the call to insure the proper things are said and the proper message conveyed. Among other things, the letter should request those holding water rights junior to the refuge to voluntarily observe the refuge priority and refrain from diversions until the refuge objective for diversion has been met.

b. Upon the start of spring snowmelt, refuge staff should begin monitoring stream diversions up-stream from the refuge. Both ground vehicle and aerial surveys should be used as needed. When diversions are found which are confirmed to be junior to the refuge claim, refuge staff should contact the person conducting the diversion and request that they immediately terminate their diversion until they receive notice from the refuge that its claim has been satisfied.

c. After a contact has been made as described in "b" above, the diversion must be checked again the following day. If diversion continues, the Refuge Manager should immediately contact the Regional Office for assistance to legally stop the diversion, and will follow whatever legal procedures are necessary to enforce the refuge priority for water.

WATER MANAGEMENT PLAN/
USE REPORT
SHORT FORM

Sheridan County
Northeast Montana WMD

Carlson WPA

Station Name

40R-W-183200-00

Water Right No.

7/1/90

Date of Inspection

Unnamed coulee

Source(s)

1990

Water Diverted: Yes No X

Means of Diversion Dam

Rate Natural flow up to 40 acre
feet per year.

*Impoundment(s): Yes X No

Water Level 0 acre feet
(Elevation or Est. Stored Amount)

*Well(s):

Free Flowing GPM
Pumped GPM

Type of Use:

Surface Irrigation
(Crop)

Fish & Wildlife X

Stock

Domestic

Other

Overall Climatic Conditions: No run-off in the spring of 1990. Very dry throughout the year. No water impounded.

Condition of Facilities: Good.

Proposed Water Program: In 1991 store all available runoff; excess water will flow thru culvert pipe spillway.

Comments: The very dry winter of 1990/91 will produce minimal runoff to Lamesteer Lake.

*If more than one impoundment or well, please attach additional sheets.

WATER MANAGEMENT PLAN/
USE REPORT
SHORT FORM

Wibaux County
Lamesteer National Wildlife Refuge
Station Name

11//27/91
Date of Inspection

39G-W-183105-00
Water Right No.

Lamesteer Creek
Source(s)

1990
Water Diverted: Yes No X

Means of Diversion Dam
Rate 647 acre feet/year

*Impoundment(s): Yes X No

Water Level 50 acre feet
(Elevation or Est. Stored Amount)

*Well(s):
Free Flowing GPM
Pumped GPM

Type of Use:
Surface Irrigation
(Crop)
Fish & Wildlife X
Stock
Domestic
Other

Overall Climatic Conditions: No known run-off in the spring of 1990. Very dry throughout the year.

Condition of Facilities: Fair to poor; dam and spillway in need of repair; SEED inspection conducted 11/27/90.

Proposed Water Program: In 1991 store available runoff; excess water will flow over the spillway.

Comments: The very dry winter of 1990/91 will produce minimal runoff to Lamesteer Lake.

*If more than one impoundment or well, please attach additional sheets.

WATER MANAGEMENT PLAN/
USE REPORT
SHORT FORM

Roosevelt County

NE Montana WMD

Johnson Lake WPA

Station Name

40R-W-183196-00

Water Right No.

7/1/90

Date of Inspection

Unnamed coulee

Source(s)

1990

Water Diverted: Yes No X

Means of Diversion Dam
Rate Natural flow of 200 CFS up
to 1,050 acre feet annually.

*Impoundment(s): Yes X No

Water Level 0 acre feet
(Elevation or Est. Stored Amount)

*Well(s):

Free Flowing GPM

Pumped GPM

Type of Use:

Surface Irrigation
(Crop)

Fish & Wildlife X

Stock

Domestic

Other

Overall Climatic Conditions: No run-off in the spring of 1990. Lake remained dry throughout the year.

Condition of Facilities: Good.

Proposed Water Program: In 1991 store available runoff; flush excess water if available to remove build-up of salts.

Comments: The very dry winter of 1990/91 will produce minimal runoff to Johnson Lake.

*If more than one impoundment or well, please attach additional sheets.